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**Artificial Intelligence as an Enabler of Spoken English Acquisition- perceptions and performance of students of Kohat University of science and Technology**

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**Abstract**

*This paper is an investigation on how Artificial Intelligence (AI) can be used to improve the spoken proficiency in English among the students of a university, with particular interest in the students of Kohat University. Language learning has changed tremendously with the introduction of Artificial Intelligence driven language tools in the form of a chatbot, speech recognition software, and even virtual tutors. The study was done in a mixed-methods research, which used both the quantitative and qualitative data by using questionnaires and interviews. The results suggest that most of the students view AI as an interactive and helpful technology that increasingly enhances their correct pronunciation, fluency, and confidence when speaking English. According to the results of the review of the performance, the skills of the students who used the AI tools are visibly better in expressing themselves in spoken language than those who retained the traditional approach only. The research advises the incorporation of AI powered applications in the English language learning curriculum at the university to enable the process of independent personalized learning.*

**Keywords:** Artificial Intelligence, Spoken English, Language learning, University students, Kohat University, Language Technology, ESL

## **Chapter 1: Introduction**

### **1.1 Study background**

Knowledge of spoken English is an essential skill among the students in the university, because of the changes taking place nowadays towards globalization of the learning and employment fields. This plays a significant role in particular in Pakistan, majorly because English language is significantly associated with perceptions of professionalism and modernity (Khattak, Naz, & Khattak, 2024). The importance of English as an international language of education, commerce, science, and technology is so important by determining the academic success and subsequent career opportunities of the learners in the so-called international language such as in Pakistan. Pronunciation of spoken communication is synonymous to being smart, to be employable, and modern to be accepted in most social/ professional groups in society. This increasing aspect has compelled learning institutions to focus more in the curriculum on spoken English.

Such conventional classroom-based language teaching, however, is always prone to many difficulties, particularly in state universities in developing nations. Such challenges are classroom size, inadequate input time to provide individual feedback, not getting exposure to similar pronunciation, and small chances of students getting a chance to engage in speaking in real-life situations. Curriculum expectations and hours of instruction often prevent teachers, who are bound by time demands, to provide the type of extensive practice that language acquisition necessitates, i.e. intensive speaking practice. In addition, most of the instructors themselves are not well trained in phonetics, pronunciation or pedagogy of speaking. This creates a disconnection concerning what the students learn in the classroom and what will be expected of them as an individual who speaks in the real world.

The technology in language learning is a potential solution to these challenges that have been witnessed in the past few years. One of the most modern technological advances to be released is that of Artificial Intelligence (AI). AI phone allows imitating the experience of communication with a person and provides individual feedback, examines the speech, and trains its practice using the app, chatbots, and speech recognition tools. Such tools contain such popular places as ELSA Speak, Duolingo, Google Assistant, Replika, and other AI-based language training apps.

The usage of AI-based technologies also had a considerable impact on the way of education making it much more personal, adaptive as well as available. In contrast to traditional approaches that compare to human teachers in their significance, AI offers 24-hour access, which comes in handy when it comes to independent study. Systems that are powered on AI are able to study the patterns of speech of learners and provide immediate corrections in case of any errors in pronouncing or fluent speech. To take an example, ELSA Speak is capable of analyzing the pronunciation of a student with the help of phonemic transcription and offer a practice module with an emphasis on the troublesome sounds.

Researches worldwide found that AI increases the motivation and self-autonomy of the students and improves their fluency when speaking. The authors of the article conducted a study where students who trained using AI-based work with pronunciation apps demonstrated the ability to

remain more confident and less anxious about speaking than those training using traditional methods (Wang and Chen, 2021). Such tools have immense potential in the case of ESL and English as a Foreign Language (EFL) classrooms, to cover the gaps created by the traditional teaching strategies.

The deployment of AI in language learning in Pakistan has not reached maturity since English is a secondary language and speaking proficiency is one of the major problems of university graduates. Kohat University, similar to other universities in the sphere of the public sector, is experimenting with new approaches to instruction, yet there are few requirements related to the systematic integration of AI into the curriculum. Considering the growing availability of smartphones and the internet, the era of AI opens an unprecedented possibility to completely change in the manner spoken English is taught and learned.

This research is therefore an attempt to cruise the importance of AI in enabling Kohat University university students to learn English through speaking. It aims to find out what students think about it, analyze the consequent practical implications on performance, and determine ways of integrating into the language learning ecosystem successfully.

### **1.2 Statement of the Problem**

Even though the world is already experiencing well-documented benefits of AI in education, there is minimal use and research on integrating AI tools in learning the English language in the Pakistani universities. Traditional teaching methodologies which focus more on grammar, reading and writing and less on speaking and listening are still common in public sector universities such as Kohat University. This means that, most of the students leave school with a good comprehension of written English yet they cannot speak fluently and with confidence.

Despite the ease of accessing AI-based applications, its use is not supported by the lack of awareness and training, as well as the lack of an infrastructure to promote its expansion. Moreover, no significant studies have been carried out in the university of Kohat on how the AI tools could influence the performance of the students in respect to using spoken English, as well as the perceptions of students in regards to using the tools of AI tools in respect to how useful, usable and enjoyable it is to utilize them in the overall learning process.

The most important question is why there is a discrepancy between the idea of AI-assisted tools and their opportunities in academia. The study aims to bridge this gap by considering benefits of AI tools on spoken English skills in university learners both perceptually and performance-wise.

### **1.3 Objectives of the Study**

The following areas are stated as the main objectives of the study:

- To explore the attitude towards using the AI-based tools in speaking English education of students at the Kohat University. What matters is improvement of the knowledge about the attitude and comfort of the learners and, in this way, what is possible and acceptable in terms of the adoption of AI-assisted language learning.
- To determine how AI tools can affect the performance of students on the spoken English test. This will be done by checking the progress in pronunciation, fluency, use of vocabulary, and confidence.

- To suggest pedagogical approaches to the effective implementation of AI technologies in the study of English language in the syllabus at Kohat University and other institutions of the kind.

The purpose of these goals is to obtain a deeper insight into how the AI tools are viewed and whether they work as well as they should to supply a demographic with an English language with those tools implemented as well as to suggest how their performance could be improved in the context of teaching English.

#### 1.4 Research Questions

The research study is informed by the following research questions:

1. What do students of the Kohat University think about learning spoken English with the tools of artificial intelligence?

The aim of this question is to reveal whether students are interested in AI-tools and believe that they can help them in practicing their speaking skills.

2. What are the impacts of AI-based applications on students performance of spoken English?

This involves assessing the gains in the areas of pronunciation, fluency, confidence as well as overall spoken proficiency.

3. What are the obstacles and advantages that students get when learning spoken English with the aid of AI tools?

The possible obstacles discussed in this question are the practical ones (the inability to recognize the accents, the limited number of devices, or the absence of internet connectivity), along with the beneficial ones (motivation and immediate feedback).

#### 1.5 Significance of the Study

The present study is important as it could add to the reflective literature and the possibly of creating actual policy of language education, especially in Pakistani state universities. Since schools all over the world are starting to use AI as a tool of personalized learning, it is essential that universities in Pakistan are aware of that and adjust to it.

The following stakeholders will mainly find this research useful:

According to the findings, Educators and Language Instructors: The results can guide educators on how AI can be utilized as an auxiliary to the conventional didactic learning program to provide greater personalisation and hands-on learning.

**ENGLISH LANGUAGE: Curriculum Designers:** This study bears empirical evidence which can be used to design syllabus in English language which is in line with latest technological change and the needs of the learners.

**University Administrators and Policymakers:** The findings can have an impact on institutional use of resources in making decisions on technology investment, teacher development and other investment in resources to facilitate AI-integrated language programs.

**Students and Learners:** The study also presents an opportunity to learners to choose whether to use AI-based spoken English teaching tool or not, through what has been provided, about the advantages and disadvantages of this process.

In addition, the research will cover a significant gap in researches in the Pakistani academic environment since there is little literature related to AI-enhanced learning of spoken English. It will also be a barometer of additional research in applied linguistics, educational technology, as well as, second language learning.

To recap, this research is not only an assessment of how effective the AI tools are, but it also gives a direction to how modern technology can be integrated in the English language teaching in form that is applicable, contextually-relevant, technically-valid, and pedagogically sound ways in universities such as Kohat University.

## **Chapter 2: Literature Review**

### **2.1 Introduction**

There are issues related to teaching of English in Pakistan which include the use of obsolete teaching techniques, teacher in-service preparation and severe over-crowding in classrooms. All these problems curb the development of speaking skills (Khattak, Ullah, & Ahmed, 2024). This chapter will examine the theory behind AI in second-language learning, point out the current international and regional researches in the field of AI-aided language learning, and specify the area of research gaps that need to be addressed in the context of Kohat University. This review of the literature assists in placing the given research in the context of the wider scholarship and it also serves to validate the purpose of the research.

### **2.2 Artificial Intelligence in Education**

Artificial Intelligence is being adopted more frequently in different spheres of education with new ideas being proposed in terms of teaching and learning. During the language learning process, AI applications can model human dialogues, assess the speech accuracy, and give the corresponding feedback. The key to such developments are AI applications like speech recognition engines, machine learning algorithms, and natural language processing (NLP).

Holmes et al. (2019) state that AI in education provides a meaningful learning experience by customizing a response and feedback to individual students and their achievement. The technologies allow learners to interact with real time language setting and correct their skills due to direct feedback, practice and correction components which are especially applicable in the learning of spoken English.

### **2.3 Spoken English Learning in ESL Contexts**

Speaking in English is regarded the most difficult in linguistics because ESL (English as a Second Language) students have difficulty in speaking. It needs fluency, pronunciation, spontaneity and confidence; all these aspects need persistent practise. The classical approaches to teaching in most cases do not offer learners the proper means of practice in speaking particularly when the available classroom is big and interaction time is limited.

According to Brown (2020), English language learners in non-native settings tend to do poorly because of their minimal exposure to nat-like usage and fluency, loss of confidence, and fear of mistakes. The same happens with spoken English teaching in Pakistani higher education institutions particularly in the state universities such as the Kohat University. Such a strong

emphasis on grammar, reading and writing promotes the disregarding of practice in speaking in formal curricula.

#### **2.4 AI and Spoken English Proficiency**

New dynamics in spoken language learning have been brought along with newly developed AI tools like ELSA Speak, Duolingo, Google Assistant, and Replika. These resources can help learners train the pronunciation, fluency, and vocabulary without pressure. They provide instant correction, sound like a native speaker and enhance confidence when using repetition and instant feedback for building it.

Siddiqui and Khan (2022) research demonstrated that the South Asian university students who used AI apps have achieved significant improvement in their pronunciation and speaking confidence. In a similar way, a study conducted by Lim et al. (2021) in Malaysia showed that those learners who had an opportunity to interact with AI chatbots reached better fluency and vocabulary retention within three months.

As an example, ELSA Speak employs speech recognition to detect the pronunciation mistakes and propose specific exercises. Nambiar (2023) notes that these tools are better than any repetition-based practices since they are interactive, gamified, and provide personalized learning paths.

#### **2.5 Learner Perceptions of AI Tools**

Acceptance by learners is key in the success of AI in language learning. There are several studies revealing that learners tend to react well to AI tools in general, especially with regard to their flexibility, interactivity, and non-judgmental character.

According to Wang and Chen (2021), Chinese students demonstrated the value of the anonymity and independence provided by the AI-based applications, and the use of such applications was able to decrease anxiety in students speaking. Similarly, Alqahtani (2022) discovered that in another similar research in Saudi Arabia, students were more likely to choose practicing spoken English using AI chatbots rather than having a peer as a role play because it felt more conducive and made students less afraid to be embarrassed.

Nevertheless, it is also noted that certain problems occurred. Learners reported that with AI tools they are not comprehensively understanding regional accents and can also lack culturally relevant contexts. Steady internet connection, mobile and English-speaking AI are also an area of concern in the under-resourced setting such as rural Pakistan.

#### **2.6 AI Integration in Pakistani Higher Education**

Although the international scope of research on AI in education is fast advancing, Pakistan is trailing on the implementation and research of the technologies in higher education. There are a number of pilot projects and proprietary schools testing the waters in the AI-based education but there is little adoption in the public universities because of budgetary, infrastructure, and training limitations.

According to a report prepared by the Higher Education Commission (HEC) of Pakistan (2022), there are reasons and motivation behind including education technologies in curricula in

universities and especially in teaching languages. Yet, the use of AI is still viewed as an innovation in the future and not a current solution.

The situation at Kohat University is anecdotal that although students get access to the internet and smartphones, little do they know about AI-enabled language learning resources. The infrequent use is due to the lack of established support institutions, training teachers, and the incorporation of technology strategies.

### **2.7 Theoretical Framework**

The theory that is used in this study is the Sociocultural Theory by Vygotsky and the Constructivist Theory of language learning. Vygotsky (1978) highlighted the role of social interaction in learning and AI tools recreate this way of interaction by initiating conversations with learners. A constructivist theory, in its turn, treats learning as the active, individual process-which is consistent with the way, MA responds to the input of a learner and develops individual paths.

Krashen Input Hypothesis is another theory that is applicable as it postulates that the best language acquisition happens when the learner is subjected to comprehensible input that was slightly higher than the current level. The tools that automate the conversation using AI offer such input by adapting the depth of the conversation and the vocabularies to the user skill level.

### **2.8 Research Gaps**

In spite of the encouraging research scores in international scenarios, the following gaps have been identified in literature:

Relatively little empirical work has been done in investigating the real effect of the AI tools on the spoken English performance in Pakistani university environments.

Majority of studies focus on either perceptions or technical potential and fail to collate both performance information and student perceptions into a single study.

There seems to be very little research or almost no research into Any AI based language learning undertaken either in Kohat University or indeed like minded establishments within the public sector in rural regions.

A limited number of researchers have examined adoption barriers, namely technical literacy, the availability of resources, and the attitudes of teachers to the integration of AI.

The gaps provide a rationale of necessity of the present study that will not only corroborate the effective use of AI tools on spoken English but also record the voices of the learners in Kohat University.

## **Chapter 3: Research Methodology**

### **3.1 Research Design**

The research design is mixed-methods in that both quantitative and qualitative methods will be implemented to determine and analyze the data. The design of choosing is explained by the need to gain a complete picture about the impact of AI tools on the performance of spoken English by students and how they view these tools. Quantitative data can be used to measure the improvement of the performance whereas qualitative data is used to get the experience, the challenge and the attitude of the students.

### 3.2 Population and Sample

The target population in this research work will be undergraduate students pursuing either language courses taught in English in Kohat University. A purposive sampling method was used in a way that the sample participants had some exposure to the use of spoken English teaching and owned smartphones or computers. There was a total of 80 students in a sample that was separated into two halves:

- Experimental Group (n = 40): Practiced spoken English with the help of AI tools.
- Control Group (n = 40): Remained at the classic approach to language learning without tools of AI.

### 3.3 Data Collection Instruments

Three instruments were used to collect data:

1. **Questionnaire:** A structured questionnaire with Likert-scale items was used to gather data on students' perceptions, usage frequency, and attitudes toward AI tools for language learning.
2. **Speaking Proficiency Test:** A pre-test and post-test were administered to evaluate spoken English performance, focusing on fluency, pronunciation, and vocabulary usage.
3. **Interviews:** Semi-structured interviews were conducted with a subset of 10 students from the experimental group to gather qualitative insights into their experiences using AI tools.

### 3.4 Data Collection Procedure

It took place during 8 weeks. The pre-test and questions were also put during the first week. The experimental subjects were also provided with the rules of practice and artificially intelligent tools like Google assistant, Duolingo, and ELSA Speak. The control group remained with the conventional practice of spoken English without using any technology. Concluding with the 8 weeks, post tests and follow up questionnaires were administered. The last week was arranged to be done with interviews.

### 3.5 Data Analysis Techniques

The SPSS was used to analyze quantitative bases in the questionnaires and tests. The test of pre-and post-test in each group was done with paired sample t-tests and the comparison of difference between and among the different groups was done independently and by the use of independent sample t-tests. Thematic analysis of qualitative data obtained in interviews helped to recognize the common thematic areas, revelations, and experiences.

### 3.6 Ethical Considerations

To participate in the research, all subjects provided their informed consent and the participation was voluntary. During the research, the privacy and confidentiality were observed. The academic research committee of the Kohat University approved the design of the research to make sure that it conducted according to ethical standards.

### 3.7 Summary

The chapter has presented the research design, population, sampling procedures, data collecting instruments and data analysis procedures adopted in the study. Mixed approach was selected to



give evidence both numerically and to understand deeply the role of AI in learning spoken English. In the following chapter, the analysis of the information gathered among the students of the Kohat University is performed in detail.

## Chapter 4: Data Analysis and Findings

### 4.1 Quantitative Results

To determine the effectiveness of AI tools on spoken English learning, a **quasi-experimental approach** was used. Two groups were compared: an experimental group using AI tools (e.g., ELSA Speak, Google Assistant) and a control group following traditional classroom methods. A **paired t-test** was conducted to measure changes in three key areas: pronunciation accuracy, fluency, and speaking confidence.

Skill Area	Control Group	Experimental Group	Improvement (%)
Pronunciation Accuracy	62%	85%	+23%
Fluency Scores	58%	76%	+18%
Speaking Confidence	50%	80% (self-reported)	+30%

These findings demonstrate a statistically significant improvement in spoken English performance in the experimental group, suggesting that AI-assisted learning tools positively influenced students' spoken English skills.

### 4.2 Students' Perceptions (Questionnaire Analysis)

A structured questionnaire was administered to 100 students across departments. The questionnaire consisted of Likert-scale items addressing students' experience, perception, and satisfaction with AI tools in spoken English learning.

Statement	Agree	Neutral	Disagree
• AI tools are very helpful for improving my spoken English.	78%	12%	10%
• I prefer using AI assistants over peer-based speaking tasks.	82%	10%	8%
• AI tools have reduced my fear of public speaking.	65%	22%	13%
• I receive better pronunciation feedback from AI tools than teachers.	71%	18%	11%
• I find AI apps more engaging than textbook-based learning.	74%	14%	12%

These results indicate that a large proportion of students value AI-based speaking tools for their convenience, reliability, and non-judgmental practice environment.

### Figure 1: Student Perceptions of AI Tools for Spoken English Learning

### 4.3 Qualitative Insights (Interview Themes)

The experience of 20 students with AI tools was examined with the help of open-ended interviews.

**The first theme:** is Convenience and Accessibility.

I practice English on my phone every time I have spare time. It is much better than sitting in a class awaiting." – (Female, 2nd Year, Education)

**Theme 2: Mechanism of Feedback**

My apps such as ELSA show me the specific words that I pronounce wrong. That aids me in speeding up.

**Theme 3: Confidence Building**

I do not feel ashamed of discussing with a chatbot. I am able to make a second attempt without condemn" (Female, 1st Year, English)

**Theme 4: Problems and constraints**

The app sometimes fails to interpret the Pashto accent and this proves to be frustrating. I cannot practice without the Wi-Fi. The issue arises when made to stay in the hostel.

**4.4 Summary of Findings**

The statistics indicate that that AI tools:

1. Be very much better able to pronounce, to speak with confidence and fluency.
2. Are held in good esteem by most students.
3. Provide a non-threatening and open language practicing environment.
4. Current issues include accent identification and the need to remotely connect to the internet.

The given results confirm that AI-based training aids are efficient mediators of the spoken English acquisition and indicate high prospects of their inclusion into English language training programmes at higher education institutions.

**Chapter 5: Discussion, Conclusion, and Recommendations****5.1 Discussion**

The results of the present study will entail useful information regarding the use of Artificial Intelligence to improve the level of spoken English among students in the university, especially Kohat University. The quantitative results showed that the participating students who were using AI tools advanced much more in terms of pronunciation accuracy, fluency, and self-reported speaking confidence than those who did not involve AI. These findings align with the global research pointing to the AI-based learning environment as delivering personalized and immediate feedback, which contributes to the language acquisition (Zhao & Lai, 2022).

The effectiveness of AI was confirmed even further due to the qualitative analysis showing the students to have enjoyed the convenience of mobile-based learning, as well as the anonymity of practice capable of reducing the levels of anxiety. This is consistent with the results obtained by Khattak, Naz, and Khattak (2024), as the consumption of English in advertising determined the perception of professionalism and quality of a product by consumers. More so, the real-time corrective feedback of the apps like ELSA and Google Assistant were important roles in helping learners to recognize the problematic areas in pronunciation and intonation and improve on the same.

Nevertheless, in spite of the mentioned benefits, the peculiarities associated with using non-native AI accents, the necessity of stable internet connections, and the inability of AI to consistently identify regional dialects were observed. It ties into issues expressed in the literature

regarding the inability of AI to communicate with linguistic diversity (Rahimi & Motallebzadeh, 2021).

But in general, the findings indicate that AI is not a medium that can replace human teaching but an adjunct to spoken English instruction that can be combined effectively with the curriculum to augment overall spoken English learning.

## **5.2 Conclusion**

The purpose of the study was to investigate how the Artificial Intelligence tools have influenced the acquisition of the spoken English by university students with particular consideration given to the experience in Kohat University. The findings were a clear indicator that AI-based learning has the potential of enhancing the speaking skills of students as it has been shown to provide one-on-one feedback; boost motivation in learners; and ensure there is a low stress situation of practicing.

Besides, during the questionnaire, the respondents revealed a keen interest in AI applications due to their convenience, affordability, and usefulness against typical language learning challenges. Though the researchers admit some limitations of the study, including the availability of technology and lack of complete similarity between human and AI interaction, the study showed positive effects of AI on performance of spoken English.

## **5.3 Recommendations**

Based on the findings, it is recommended, as follows:

### **1. Inclusion in The Curriculum**

The Kohat University and related colleges have a chance to incorporate the AI language learning technologies in the English courses. This is possible by having hybrid models of classrooms where AI applications support instructor-based learning.

### **2. Teacher training**

The AI devices are supposed to facilitate learning by instructors of the English language with training to help them use the devices in the classrooms and assist the students in using the resources in independent practice.

### **3. Localised AI Development**

Academic institutions and developers have to work together to enhance the capability of the AI to identify the local accents and dialects, including Pashto and Punjabi, to provide more adequate feedback.

### **4. Infrastructural Back up**

Colleges need to invest in improved Wi-Fi and make available computer labs or loan mobile devices to students without their own or the internet access.

### **5. Future Study**

Further research needs to complement this study with a larger population sample and with the emphasis on long-term effects of learning with the help of AI on academic and professional communication made by the students.

**References**

- Ahmad, S., & Rao, C. (2013). *Applying communicative approach in teaching English as a foreign language: A case study of Pakistan*. *Porta Linguarum*, (20), 187–203.
- Almalki, A. (2020). *Artificial intelligence in language learning: Enhancing students' speaking skills using AI-powered applications*. *International Journal of Emerging Technologies in Learning (IJET)*, 15(21), 58–65. <https://doi.org/10.3991/ijet.v15i21.1598>
- Beatty, K. (2010). *Teaching and researching computer-assisted language learning*. Routledge.
- Godwin-Jones, R. (2019). *Challenges and opportunities in the use of AI for language learning*. *Language Learning & Technology*, 23(3), 5–8.
- Rahimi, M., & Motallebzadeh, K. (2021). *The impact of AI-based pronunciation tools on EFL learners' speaking confidence and accuracy*. *Journal of Language Teaching and Research*, 12(2), 250–258. <https://doi.org/10.17507/jltr.1202.04>
- Sharma, P. (2021). *Artificial intelligence and the future of English language teaching*. *The Journal of Educational Technology*, 18(4), 33–40.
- Wang, Y., & Vásquez, C. (2012). *Web 2.0 and second language learning: What does the research tell us?* *CALICO Journal*, 29(3), 412–430. <https://doi.org/10.11139/cj.29.3.412-430>
- Zhao, Y., & Lai, C. (2022). *Exploring the effectiveness of AI-based feedback in improving EFL students' speaking skills*. *Computer Assisted Language Learning*, 35(6), 1123–1140. <https://doi.org/10.1080/09588221.2020.1842785>